

Complete atrioventricular block during tunneled cuffed hemodialysis catheter insertion in a patient with pre-existing left bundle branch block

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Arrhythmias are complications of tunneled cuffed hemodialysis catheter insertion. Most complications associated with arrhythmias occur during guide-wire access, where the guide wire can cause traumatic damage to the conduction system of the heart. Conducting system injury in tunneled cuffed hemodialysis catheter insertion often involves the right bundle, causing right bundle branch block (RBBB). Transient RBBB with sinus rhythm is not usually accompanied by abnormal vital signs. However if patients already have left bundle branch block (LBBB), new onset RBBB can cause complete atrioventricular block (AVB), which can lead to fatal complications requiring invasive treatment. We report on a patient with LBBB who developed complete AVB during hemodialysis catheter insertion.

Keywords: Hemodialysis; Atrioventricular block; Left bundle branch block

INTRODUCTION

Tunneled cuffed catheters are used to enable adequate vascular access during hemodialysis in patients with end-stage renal disease or acute kidney injury (AKI). Common immediate complications of catheterization include atrial or ventricular tachycardia, pneumothorax, hemothorax, cardiac tamponade, and mediastinal fluid collection [1,2]. However, complete atrioventricular block (AVB) is a rare complication of catheterization.

We report on a patient with pre-existing left bundle branch block (LBBB) who developed complete AVB during tunneled cuffed hemodialysis catheter insertion.

CASE

A 73-year-old man was admitted with dyspnea. He had

a history of hypertension, dilated cardiomyopathy, diabetes mellitus, chronic obstructive lung disease, and chronic kidney disease. He was treated with nifedipine. On examination, his blood pressure (BP) and pulse rate were 170/90 mmHg and 88 beats/min respectively, and he had pitting edema. Chest radiography showed pulmonary congestion and cardiomegaly (Fig. 1). An electrocardiogram (ECG) showed a newly developed LBBB with sinus rhythm (Fig. 2A). Emergency coro-



Fig. 1. Chest radiography showed pulmonary congestion and cardiomegaly.

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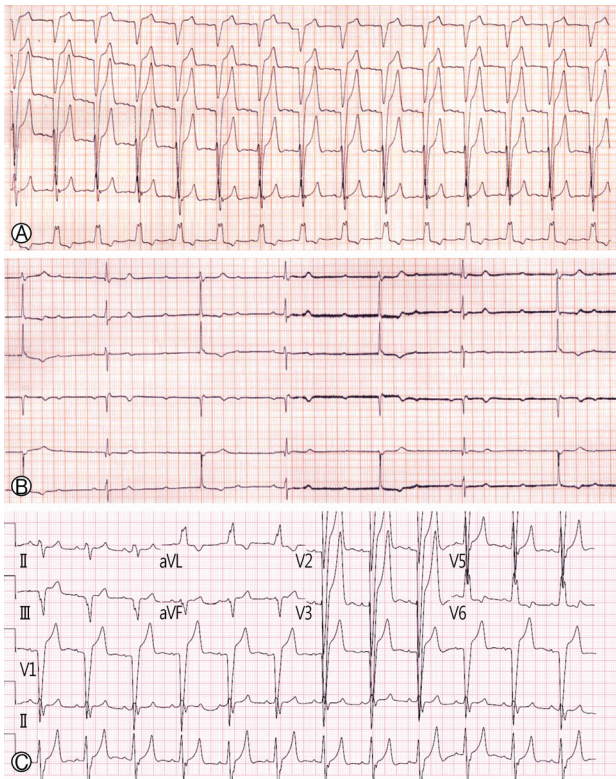


Fig. 2. Electrocardiogram showing pre-existing left bundle branch block (A). Development of complete atrioventricular block during guide-wire insertion (B). Electrocardiogram showing recovered LBBB with sinus rhythm (C).

nary angiography showed no significant coronary artery disease and serum creatinine was 7.17 mg/dL. Thus hemodialysis was required for control of uremia and pulmonary edema.

Tunneled cuff hemodialysis catheter insertion was attempted via the right internal jugular vein. Soon after the guide wire was passed, the ECG trace changed from a LBBB to complete AVB (Fig. 2B). The cardiac monitor showed complete AVB with an escaped ventricular rhythm. BP and ventricular rate were 130/70 mmHg and 37 beats/min, respectively.

He did not complain of dyspnea or chest discomfort. Cardiac enzymes were in the normal range. The reading was verified using portable echocardiography, and the results remained the same. With close observation, ECG recovered to LBBB without any invasive procedures such as pacemaker or atropine injection (Fig. 2C).

DISCUSSION

Tunneled cuffed catheters are used to enable adequate vas-

cular access during hemodialysis in patients with end-stage renal disease or AKI. The introducer needle is inserted into the right internal jugular vein, and the guide-wire is inserted via a needle. Venous access should be established first, and then maintained. Most complications associated with arrhythmias occur during guide-wire access. Therefore, careful monitoring of ECG, oxygen saturation, and BP is required during catheterization. Common immediate complications of catheterization include atrial or ventricular tachycardia, pneumothorax, hemothorax, cardiac tamponade, and mediastinal fluid collection [1,2]. Atrial or ventricular arrhythmia is a common complication of venous catheterization. The incidence of RBBB during right heart catheterization is approximately 5%, and AVB is very rare in a right heart catheterization [1-3].

The right bundle branch is placed anatomically in the right ventricle endocardium and right bundle branch block (RBBB) can be caused by mechanical trauma induced by the guide-wire [4]. Transient RBBB with sinus rhythm is not usually accompanied by abnormal vital signs. Patients with pre-existing LBBB are at high risk for development of AVB, which can be a life-threatening complication. The patient's vital signs were stable without temporary pacing or inotropics. A patient's vital signs, heart conduction system, duration of catheter placement, and vascular abnormalities must be considered when choosing a hemodialysis catheter. It is generally recommended that the guide-wire length does not exceed 22 cm and cannulae should be inserted to a depth of 13-16 cm via the right, and 15-20 cm via the left jugular vein [5-7]. In addition, guide-wires should be inserted gently and the use of a curved guide-wire may be helpful in reducing mechanical trauma of the heart conduction system.

In summary, hemodialysis catheterization should be performed carefully in patients with pre-existing LBBB with preparation for the possibility of progression to AVB. And, when determining hemodialysis catheter access, the patient's heart conduction system, vital signs, and vascular abnormality should be considered.

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